

the oxygen and hydrogen from water are primary results; and so also are the acid and alkali (themselves compound bodies) evolved from sulphate of soda. But when the substances separated by the current are changed at the electrodes before their appearance, then they give rise to secondary results, although in many cases the bodies evolved are elementary.

479. These secondary results occur in two ways, being sometimes due to the mutual action of the evolved substance and the matter of the electrode, and sometimes to its action upon the substances contained in the body itself under decomposition.

Thus, when carbon is made the positive electrode in dilute sulphuric acid, carbonic oxide and carbonic acid occasionally appear there instead of oxygen; for the latter, acting upon the matter of the electrode, produces these secondary results. Or

if the positive electrode, in a solution of nitrate or acetate of lead, be platina, then peroxide of lead appears there, equally a secondary result with the former, but now depending upon an action of the oxygen on a substance in the solution. Again,

when ammonia is decomposed by platina electrodes, nitrogen

appears at the *anode*; * but though an *elementary* body, it is a

secondary result in this case, being derived from the chemical action of the oxygen electrically evolved there, upon the ammonia in the surrounding solution (290). In the same

manner when aqueous solutions of metallic salts are decomposed by the current, the metals evolved at the *cathode*, though elements, are *always* secondary results, and not immediate consequences of the decomposing power of the electric current.

480. Many of these secondary results are extremely valuable;

for instance, all the interesting compounds which M. Becquerel has obtained by feeble electric currents are of this nature; but they are essentially chemical, and must, in the theory of electrolytic action, be carefully distinguished from those which are directly due to the action of the electric current.

481. The nature of the substances evolved will often lead to a correct judgment of their primary or secondary character, but is not sufficient alone to establish that point. Thus, nitrogen is said to be attracted sometimes by the positive and sometimes

by the negative electrode, according to the bodies with which it may be combined (290, 291), and it is on such occasions evidently viewed as a primary result;² but I think I shall show that, when it appears at the positive electrode, or rather at the *anode*, it is a secondary result (483). Thus, also, Sir Humphry

¹ *Annales de Chimie*, 1804, torn. li. p. 167. ² *Ibid.* p. 172.